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09/856,912	08/23/2001	Bernd Mueller	R-36127	6415

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Walter Ottesen
PO Box 4026
Gaithersburg, MD 20885-4026

EXAMINER

OLSEN, KAJ K

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 06/27/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/856,912

Applicant(s)

MUELLER ET AL.

Examiner

Kaj Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 8-15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 8-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claim 8 specifies a step of applying a pump voltage across the first and second electrodes as well as a step of applying a constant external voltage to the electrodes. Hence it appears the applicant is specifying two separate steps of applying a voltage. However, it is the examiner's interpretation of the specification that there is only a single step of applying voltage for the embodiment that is the subject of this claim. In other words, it is the examiner's understanding that applicant applies a single voltage that both provides a reduced oxygen partial pressure in the reference chamber and is the voltage that deviates from thermodynamic equilibrium voltage. If the examiner is correct, then claim 8 is confusing because it is implying that there are two separate steps of applying voltage. Clarification is requested.
4. Claim 8 also specifies that the applied voltage results in a "somewhat reduced oxygen partial pressure". This is confusing for two reasons. First, it is unclear what the metes and bounds of "somewhat reduced" pressure would be and the examiner recommends the applicant delete the "somewhat" from the claim. Second, it is unclear what the partial pressure of oxygen is being reduced from (the pressure in the reference atmosphere?). Clarification is requested.

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5. In claim 8, it is unclear from the specification what the applicant is specifically referring to when they specify the "thermodynamic equilibrium voltage of the wanted reaction". First, it is unclear what applicant means by thermodynamic equilibrium voltage. Is applicant referring to a Nernst potential for the constituents of the desired reaction? Is applicant instead referring to the standard equilibrium potential for the desired reaction? It is unclear from the specification how this claimed term is meant to be interpreted. In addition, the use of the term "wanted reaction" is confusing. Is applicant referring to a reaction of the species that the applicant wants to sense with the exhaust gas probe?

6. In claim 8, it would appear that the "dropping" in the final limitation should be --flowing--. Current is typically considered to flow while potential (or voltage) is considered to drop.

7. In claim 10, the use of the term "somewhat reduced oxygen partial pressure" is confusing for the same reasons set forth above for claim 8.

8. Claim 10 is also indefinite because it would appear from the specification that the "applying a pump voltage" and "applying a constant current" are one in the same step. In other words, it would appear that the voltage applied across the electrodes also provides the constant current even though the claim gives the impression these represent two distinct steps. This argument here is similar to the indefiniteness argument provided above for the two applying voltage steps of claim 8.

9. In claim 10, it is unclear what "voltage adjusting" is referring to. It is the examiner's understanding that the embodiment described in claim 10 applies a constant current and allows the measured voltage to float to whatever voltage results from the flow of the current and the

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presence of the gas to be sensed. In other words, there doesn't appear to be any "adjusting" of the actual voltage as appears to be set forth with this limitation.

10. In claim 10, the use of the terms "thermodynamic equilibrium voltage" and "desired reaction" are unclear for the same reasons set forth above for these terms (or analogous terms) in claim 8.

11. Claims 12 and 14 are indefinite for the same reasons claims 8 and 10 respectively were found to be indefinite.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claims 10 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Gao et al (USP 6,551,497).

14. With respect to claim 10 as best understood, Gao discloses a method of operating a mixed-potential exhaust gas probe for an internal combustion engine (see Background of the Invention in col. 1 and 2). The exhaust gas probe comprising a heatable probe ceramic, a first electrode 42 mounted in a chamber 39 subjected to a reference atmosphere, a second electrode 32 arranged in the exhaust gas of the engine (fig. 3(B) and col. 5, lines 49-67). Gao discloses applying a pump voltage across the electrodes via voltage and current source 35 (col. 4, lines 52-

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67). With respect to the limitation requiring the pump voltage reduce the partial pressure of the reference chamber, because Gao discloses both positive and negative pump voltages (col. 4, line 61), Gao thereby discloses both pumping oxygen out of and into the reference chamber. Said voltage of Gao is applied such a constant current is applied and the result of said applied current is the measurement of a voltage across the electrodes that deviates from the thermodynamic equilibrium (col. 4, lines 54 and 55 and the last three lines of the abstract).

15. With respect to claim 11, see Table 1 in col. 8.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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18. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gao in view of Logothetis et al (pp. 136-154 of Fundamental and Applications of Chemical Sensors, 1986).

19. With respect to claim 8 as best understood, Gao discloses a method of operating a mixed-potential exhaust gas probe for an internal combustion engine (see Background of the Invention in col. 1 and 2). The exhaust gas probe comprising a heatable probe ceramic, a first electrode 42 mounted in a chamber 39 subjected to a reference atmosphere, a second electrode 32 arranged in the exhaust gas of the engine (fig. 3(B) and col. 5, lines 49-67). Gao discloses applying a pump voltage across the electrodes via voltage and current source 35 (col. 4, lines 52-67). With respect to the limitation requiring the pump voltage reduce the partial pressure of the reference chamber, because Gao discloses both positive and negative pump voltages (col. 4, line 61), Gao thereby discloses both pumping oxygen out of and into the reference chamber depending on the choice of polarity of voltage across the circuit. Said applied voltage of Gao is constant and causes the thermodynamic equilibrium voltage of the wanted reaction to differ from the applied voltage (e.g. table 1 in col. 8). Gao does not teach the step of measuring and evaluating the current across the electrodes (Gao teaches the use of a voltmeter). However, the relationship between current flow and potential across a pair of electrodes is well known in the art (i.e. it stems from Ohm's law). In fact, both voltmeters and ammeters are based on the principle of galvanic meters. In particular, Logothetis teaches that the voltage across electrodes (i.e. the electromotive force (EMF)) can be derived from either a measure of the voltage across the electrodes or the current flowing across a load resistor (equations 2 and 3 of p. 137 and the associated discussion). It would have been obvious to one of ordinary skill in the art at the time the invention was being

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made to utilize the teaching of Logothetis for the method of Gao because the substitution of one known means for determining potential difference (i.e. a voltmeter) for another (i.e. an ammeter), when the results are not unexpected requires only routine skill in the art.

20. With respect to claim 9, see Table 1 in col. 8.

Allowable Subject Matter

21. Claims 12-15 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

22. The following is a statement of reasons for the indication of allowable subject matter: references such as Nielson, Yaguchi and Nakajima all teach various aspects of the claimed circuit configurations of claims 12-15. However, none of these references, nor the prior art, teach all aspects of the claimed circuitry, with particular attention to either the difference amplifier amplifying the difference between the non-inverting input and the output of operational amplifier (claim 12) or to the presence of exhaust gas probe being in the feedback loop in conjunction with the presence of a voltage divider connected to the non-inverting input (claim 14). In addition, it would not have been obvious to arrive at the claimed circuitry absent hindsight reconstruction of the invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (703) 305-0506. The

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examiner can normally be reached on Monday through Thursday from 7:00 AM-4:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mr. Nam Nguyen, can be reached at (703) 308-3322.

When filing a fax in Group 1700, please indicate in the header "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communications with the PTO that are not for entry into the file of this application. This will expedite processing of your papers. The fax number for regular communications is (703) 305-3599 and the fax number for after-final communications is (703) 305-5408.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, whose telephone number is (703) 308-0661.



Kaj K. Olsen
Patent Examiner
AU 1753
June 25, 2003